

SEQUENCE LISTING

COPY

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<120> METHOD FOR PRODUCING L-AMINO ACID USING BACTERIA BELONGING TO THE GENUS
ESCHERICHIA

<130> 219594US0

<140> 10/073,293

<141> 2002-02-13

<150> RU 2001103865

<151> 2001-02-13

<150> RU 2001104998

<151> 2001-02-26

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<150> RU 2001117632

<151> 2001-06-28

<150> RU 2001117633

<151> 2001-06-28

<160> 16

<170> PatentIn version 3.1

<210> 1

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<212> DNA

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26

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ccgatccga tatagtaacg acagtg

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<210> 3

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<212> DNA

<213> Escherichia coli

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<222> (1)..(735)

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1				5				10						15		

gaa	gga	tgc	aaa	gac	agt	tta	ccg	att	gtt	att	agt	tat	att	ccg	gtg	96
Glu	Gly	Cys	Lys	Asp	Ser	Leu	Pro	Ile	Val	Ile	Ser	Tyr	Ile	Pro	Val	
			20					25					30			

gcc	ttt	gcg	ttc	ggg	ctg	aat	gcg	acc	cgt	ctg	gga	ttc	tct	cct	ctc	144
Ala	Phe	Ala	Phe	Gly	Leu	Asn	Ala	Thr	Arg	Leu	Gly	Phe	Ser	Pro	Leu	
		35					40					45				

gaa	agc	ggt	ttt	ttc	tcc	tgc	atc	att	tat	gca	ggc	gcg	agc	cag	ttc	192
Glu	Ser	Val	Phe	Phe	Ser	Cys	Ile	Ile	Tyr	Ala	Gly	Ala	Ser	Gln	Phe	
	50					55					60					

gtc	att	acc	gcg	atg	ctg	gca	gcc	ggg	agt	agt	ttg	tgg	att	gct	gca	240
Val	Ile	Thr	Ala	Met	Leu	Ala	Ala	Gly	Ser	Ser	Leu	Trp	Ile	Ala	Ala	
65					70				75						80	

ctg	acc	gtc	atg	gca	atg	gat	gtt	cgc	cat	gtg	ttg	tat	ggc	ccg	tca	288
Leu	Thr	Val	Met	Ala	Met	Asp	Val	Arg	His	Val	Leu	Tyr	Gly	Pro	Ser	
				85					90					95		

ctg	cgt	agc	cgt	att	att	cag	cgt	ctg	caa	aaa	tcg	aaa	acc	gcc	ctg	336
Leu	Arg	Ser	Arg	Ile	Ile	Gln	Arg	Leu	Gln	Lys	Ser	Lys	Thr	Ala	Leu	
			100					105					110			

tgg	gcg	ttt	ggc	ctg	acg	gat	gag	gtt	ttt	gcc	gcc	gca	acc	gca	aaa	384
Trp	Ala	Phe	Gly	Leu	Thr	Asp	Glu	Val	Phe	Ala	Ala	Ala	Thr	Ala	Lys	
		115					120					125				

ctg	gta	cgc	aat	aat	cgc	cgc	tgg	agc	gag	aac	tgg	atg	atc	ggc	att	432
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Leu	Val	Arg	Asn	Asn	Arg	Arg	Trp	Ser	Glu	Asn	Trp	Met	Ile	Gly	Ile		
130						135					140						
gcc	ttc	agt	tca	tgg	tca	tcg	tgg	gta	ttt	ggg	acg	gta	ata	ggg	gca	480	
Ala	Phe	Ser	Ser	Trp	Ser	Ser	Trp	Val	Phe	Gly	Thr	Val	Ile	Gly	Ala	160	
145					150					155							
ttc	tcc	ggc	agc	ggc	ttg	ctg	caa	ggg	tat	ccc	gcc	gtt	gaa	gct	gca	528	
Phe	Ser	Gly	Ser	Gly	Leu	Leu	Gln	Gly	Tyr	Pro	Ala	Val	Glu	Ala	Ala	175	
				165					170								
tta	ggg	ttt	atg	ctt	ccg	gca	ctc	ttt	atg	agt	ttc	ctg	ctc	gcc	tct	576	
Leu	Gly	Phe	Met	Leu	Pro	Ala	Leu	Phe	Met	Ser	Phe	Leu	Leu	Ala	Ser	190	
			180					185									
ttc	cag	cgc	aaa	caa	tct	ctt	tgc	gtt	acc	gca	gcg	tta	gtt	ggg	gcc	624	
Phe	Gln	Arg	Lys	Gln	Ser	Leu	Cys	Val	Thr	Ala	Ala	Leu	Val	Gly	Ala	205	
		195					200										
ctt	gca	ggc	gta	acg	cta	ttt	tct	att	ccc	gtc	gcc	att	ctg	gca	ggc	672	
Leu	Ala	Gly	Val	Thr	Leu	Phe	Ser	Ile	Pro	Val	Ala	Ile	Leu	Ala	Gly	220	
	210					215					220						
att	gtc	tgt	ggc	tgc	ctc	act	gcg	tta	atc	cag	gca	ttc	tgg	caa	gga	720	
Ile	Val	Cys	Gly	Cys	Leu	Thr	Ala	Leu	Ile	Gln	Ala	Phe	Trp	Gln	Gly	240	
225					230					235							
gcg	ccc	gat	gag	cta	tga											738	
Ala	Pro	Asp	Glu	Leu													
				245													

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<212> PRT

<213> Escherichia coli

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			20					25					30				

Ala	Phe	Ala	Phe	Gly	Leu	Asn	Ala	Thr	Arg	Leu	Gly	Phe	Ser	Pro	Leu
		35					40					45			
Glu	Ser	Val	Phe	Phe	Ser	Cys	Ile	Ile	Tyr	Ala	Gly	Ala	Ser	Gln	Phe
	50					55					60				
Val	Ile	Thr	Ala	Met	Leu	Ala	Ala	Gly	Ser	Ser	Leu	Trp	Ile	Ala	Ala
65					70					75					80
Leu	Thr	Val	Met	Ala	Met	Asp	Val	Arg	His	Val	Leu	Tyr	Gly	Pro	Ser
				85					90					95	
Leu	Arg	Ser	Arg	Ile	Ile	Gln	Arg	Leu	Gln	Lys	Ser	Lys	Thr	Ala	Leu
			100					105						110	
Trp	Ala	Phe	Gly	Leu	Thr	Asp	Glu	Val	Phe	Ala	Ala	Ala	Thr	Ala	Lys
		115					120					125			
Leu	Val	Arg	Asn	Asn	Arg	Arg	Trp	Ser	Glu	Asn	Trp	Met	Ile	Gly	Ile
	130					135					140				
Ala	Phe	Ser	Ser	Trp	Ser	Ser	Trp	Val	Phe	Gly	Thr	Val	Ile	Gly	Ala
145					150					155					160
Phe	Ser	Gly	Ser	Gly	Leu	Leu	Gln	Gly	Tyr	Pro	Ala	Val	Glu	Ala	Ala
				165					170					175	
Leu	Gly	Phe	Met	Leu	Pro	Ala	Leu	Phe	Met	Ser	Phe	Leu	Leu	Ala	Ser
			180					185					190		
Phe	Gln	Arg	Lys	Gln	Ser	Leu	Cys	Val	Thr	Ala	Ala	Leu	Val	Gly	Ala
		195					200					205			
Leu	Ala	Gly	Val	Thr	Leu	Phe	Ser	Ile	Pro	Val	Ala	Ile	Leu	Ala	Gly
	210					215					220				
Ile	Val	Cys	Gly	Cys	Leu	Thr	Ala	Leu	Ile	Gln	Ala	Phe	Trp	Gln	Gly
225					230					235					240

Ala Pro Asp Glu Leu
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<222> (1)..(333)

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1 5 10 15	
tat tgc ttc cgc tat ttg ccg ctg cgc ctg cgt gtg ggt aat gcc cgc	96
Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg	
20 25 30	
cca acc aaa cgt ggc gcg gta ggt att ttg ctc gac acc att ggc atc	144
Pro Thr Lys Arg Gly Ala Val Gly Ile Leu Leu Asp Thr Ile Gly Ile	
35 40 45	
gcc tcg ata tgc gct ctg ctg gtt gtc tct acc gca cca gaa gtg atg	192
Ala Ser Ile Cys Ala Leu Leu Val Val Ser Thr Ala Pro Glu Val Met	
50 55 60	
cac gat aca cgc cgt ttc gtg ccc acg ctg gtc ggc ttc gcg gta ctg	240
His Asp Thr Arg Arg Phe Val Pro Thr Leu Val Gly Phe Ala Val Leu	
65 70 75 80	
ggt gcc agt ttc tat aaa aca cgc agc att atc atc cca aca ctg ctt	288
Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu	
85 90 95	
agt gcg ctg gcc tat ggg ctc gcc tgg aaa gtg atg gcg att ata taa	336
Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile	
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<211> 111

<212> PRT

<213> Escherichia coli

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Met Ser Tyr Glu Val Leu Leu Leu Gly Leu Leu Val Gly Val Ala Asn
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Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg
20 25 30

Pro Thr Lys Arg Gly Ala Val Gly Ile Leu Leu Asp Thr Ile Gly Ile
35 40 45

Ala Ser Ile Cys Ala Leu Leu Val Val Ser Thr Ala Pro Glu Val Met
50 55 60

His Asp Thr Arg Arg Phe Val Pro Thr Leu Val Gly Phe Ala Val Leu
65 70 75 80

Gly Ala Ser Phe Tyr Lys Thr Arg Ser Ile Ile Ile Pro Thr Leu Leu
85 90 95

Ser Ala Leu Ala Tyr Gly Leu Ala Trp Lys Val Met Ala Ile Ile
100 105 110

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ctgtttctag atcctgtgtg aaattgttat ccgc

34

<210> 9

<211> 28

<212> DNA

<213> Artificial Sequence

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ggtctagata tggctaacat tatccggc

28

<210> 10

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1 5 10 15

ggg tta ttt gcg ctg gtc aac ccg gta ggg att att ccc gtc ttt atc 96
Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile
20 25 30

agc atg acc agt tat cag aca gcg gca gcg cga aac aaa act aac ctt 144
Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu
35 40 45

aca gcc aac ctg tct gtg gcc att atc ttg tgg atc tcg ctt ttt ctc 192
Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu
50 55 60

ggc gac acg att cta caa ctt ttt ggt ata tca att gat tcg ttc cgt 240
Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg
65 70 75 80

atc gcc ggg ggt atc ctg gtg gtg aca ata gcg atg tcg atg atc agc 288
Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser
85 90 95

ggc aag ctt ggc gag gat aaa cag aac aag caa gaa aaa tca gaa acc	336
Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr	
100 105 110	
gcg gta cgt gaa agc att ggt gtg gtg cca ctg gcg ttg ccg ttg atg	384
Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met	
115 120 125	
gcg ggg cca ggg gcg atc agt tct acc atc gtc tgg ggt acg cgt tat	432
Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr	
130 135 140	
cac agc att agc tat ctg ttt ggt ttc ttt gtg gct att gca ttg ttc	480
His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe	
145 150 155 160	
gct tta tgt tgt tgg gga ttg ttc cgc atg gca ccg tgg ctg gta cgg	528
Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg	
165 170 175	
gtt tta cgc cag acc ggc atc aac gtg att acg cgt att atg ggg cta	576
Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu	
180 185 190	
ttg ctg atg gca ttg ggg att gaa ttt atc gtt act ggt att aag ggg	624
Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly	
195 200 205	
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Ile Phe Pro Gly Leu Leu Asn	
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<210> 12

<211> 215

<212> PRT

<213> Escherichia coli

<400> 12

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Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile	
20 25 30	

Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu
35 40 45

Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu
50 55 60

Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg
65 70 75 80

Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser
85 90 95

Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr
100 105 110

Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met
115 120 125

Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr
130 135 140

His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe
145 150 155 160

Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg
165 170 175

Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu
180 185 190

Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly
195 200 205

Ile Phe Pro Gly Leu Leu Asn
210 215

<210> 13

<211> 28

<212> DNA

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<210> 16

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<212> PRT

<213> Escherichia coli

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Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu
20 25 30

Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu
35 40 45

Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe
50 55 60

Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu
65 70 75 80

Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser
85 90 95

Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile
100 105 110

Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser
115 120 125

His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu
130 135 140

Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu
145 150 155 160

Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly
165 170 175

Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg
180 185 190

Met Trp Met Lys Gly
195